

Course: Algebra 2
Unit: Conic Sections
Section: Parabolas

Avatar: Graphing a Parabola With a Vertex at (h, k)

Slide 1:

Hi there. Do you want to be partners for this exercise? Great. So here is the problem we were assigned. The teacher wants us to find the equation of the parabola with a focus of nine five and a directrix at y is equal to negative five.

Slide 2:

Since the directrix is at $y = -5$ it looks like the parabola will open up since the directrix is below the focus. The general equation of the directrix of a parabola that opens upward is y is equal to k minus p .

Slide 3:

Also since the focus for this type of parabola is define as h comma k plus p , and our focus is nine comma 5, we know that h is equal to nine. I think we are making good progress. Now we need to find k and p and then I think we will be able to build the whole equation.

Slide 4:

I think we have two equations and two unknowns to find k and p .
 k plus p is equal to five. This comes from the focus.
 k minus p is equal to negative five. This comes from the directrix.
We can solve the equations using elimination for k .
 k is equal to zero.

Slide 5:

We now know that the vertex is at $(9, 0)$. I think we are almost there. We need to find the value of p .
We know the directrix is equal to y equal $k - p$.
Since the directrix is y equals negative five we can write the equation negative five is equal to k minus p .
Plugging in our value of k we can write the equation negative five is equal to zero minus p .
Solving the equation we can see that p is equal to five.

Slide 6:

Do you think we have enough information to solve the problem? I think we do. We can use the general equation y minus k is equal to one over four times p times the quantity x minus h squared.
Plugging in the values of h , k , and p we found in the previous steps we can write a final equation of y is equal to one over twenty times the quantity x minus nine squared.